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Placentia Bay-Grand Banks Large Ocean Management Area Ecologically and Biologically Significant Areas

Zones d'importance écologique ou biologique dans la zone étendue de gestion des océans de la baie de Plaisance et des Grands bancs

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FOREWORD

This document was not formally peer-reviewed under the Department of Fisheries Oceans (DFO) Science Advisory Process coordinated by the Canadian Science Advisory Secretariat (CSAS). However, it is being documented in the CSAS Research Document series as it presents some key scientific information related to the advisory process.

AVANT-PROPOS

Le présent document n'a pas été revu selon le processus consultatif scientifique du ministère des Pêches et des Océans (MPO), coordonné par le Secrétariat canadien de consultation scientifique (SCCS). Cependant, il est intégré à la collection de documents de recherche du SCCS car il présente certains renseignements scientifiques clés, liés au processus consultatif.

ABSTRACT

The purpose of this report is to identify Ecologically and Biologically Significant Areas (EBSAs) for the Placentia Bay-Grand Banks Large Ocean Management Area (PBGB LOMA) based on the guidelines in CSAS Ecosystem Status Report 2004/006. The exercise was carried out using information from several key documents that detailed ecosystem overview and status, fish distribution and spawning, and single species assessment. Scientists in the Newfoundland Region also provided input on those areas that they felt could be deemed significant based on their knowledge and experience. The result of these exercises was the identification and description of 11 EBSAs and their significant features, as well as a corresponding map.

RÉSUMÉ

L'objet de ce rapport est de déterminer les zones d'importance écologique et biologique qui font partie de la Zone étendue de gestion des océans de la baie de Plaisance et des Grands bancs, d'après les lignes directrices du rapport sur l'état de l'écosystème 2004/006 du SCCS. L'exercice a été réalisé à l'aide d'information tirée de plusieurs documents principaux qui décrivent en détail les grandes lignes et l'état de l'écosystème, les aires de répartition et de reproduction des poissons et fournissent une évaluation de différentes espèces. Les scientifiques de la Région de Terre-Neuve ont aussi fourni de l'information sur les zones qu'ils jugeaient importantes en se fondant sur leurs connaissances et leur expérience. Le résultat de ces exercices a été la désignation et la description de 11 ZIEB et de leurs caractéristiques importantes, ainsi qu'une carte correspondante.

INTRODUCTION

This report provides a description and results of the processes carried out to identify EBSAs for the PBGB LOMA. Following the approach outlined in CSAS Ecosystem Status Report 2004/006, significant biological and ecological properties of various areas in the LOMA were evaluated for their relevance to the primary dimensions of Uniqueness, Aggregation, and Fitness Consequences, and summarized in an EBSA matrix (Table 1). Information related to the secondary dimensions of Resilience and Naturalness for the EBSAs was also noted within the matrix.

It has been accepted that the evaluation of areas as Ecologically and Biologically Significant can often be biased towards having a higher likelihood of considering data-rich areas to be Ecologically and Biologically Significant than comparatively data-poor areas (DFO 2004). Naturally, **the better studied an area**, the more likely it will appear to be unique in some way, support high aggregations of a species, or be a site for some functionally important activity.

While there are many areas that do not qualify as EBSAs within this framework, that does not mean they have no ecological or biological importance at all. Rather, such areas may not warrant the *enhanced* level of protection relative to many other similar areas, or they may be areas that are data deficient. As such, the following list of the EBSAs for the PBGB LOMA are those that could be identified based on the *best available information* and *at a given point in time*. In addition, it should be noted that "low priority" areas still possess an ecological or biological significance greater than that of other non-EBSA areas within the LOMA.

METHODS

The identification of EBSAs within the boundaries of the PBGB LOMA was undertaken through a combination of three exercises. First, information which stood out during the composition of the PBGB Ecosystem Overview and Assessment Report (EOAR) was recorded for areas that were noted for having structural and/or functional significance in the PBGB LOMA. Second, a literature search was carried out that led to the identification of several key documents detailing demersal fish distribution across the Grand Banks (Kulka et al. 2003), the distribution and timing of spawning for 10 commercially important species (Ollerhead et al. 2004), the ecological importance of the southern area of the Grand Banks (Fuller and Myers 2004), as well as other species specific research documents (Kulka 2006; Walsh et al. 2001). Finally, using a questionnaire and a map, key scientists in the region where given the opportunity provide input on those areas that they felt could be deemed significant based on their knowledge and experience. Several instances of personal communication with knowledgeable persons provided much useful unpublished information.

Significant species and habitat features identified through the above processes were evaluated to be 'high', 'moderate' and 'low' against the following dimensions:

PRIMARY DIMENSIONS

Uniqueness

Ranked from areas whose characteristics are unique, rare, distinct, and for which alternatives do not exist to areas whose characteristics are widespread with many areas which are similar in most important features. Uniqueness may be considered in regional, national and global context, with increased importance at each scale.

Aggregation

Ranked from areas where: i.) Most individuals of a species are aggregated for some part of the year; ii.) Most individuals use the area for some important function in their life history; iii.) Some structural feature or ecological process occurs with exceptionally high density. To areas where: iv.) Individuals of a species are widespread and even areas of comparatively high density do not contain a substantial portion of the total population; v.) Individuals may congregate to perform a life-history function, but the area in which they perform the function varies substantially over time; vi.) structural property or ecological process occurs in many alternative areas.

Fitness Consequences

Ranked from areas where the life history activity(ies) undertaken make a major contribution to the fitness of the population or species present to areas where the life history activity(ies) undertaken make only marginal contribution to fitness. (Generally applies to functional properties of areas, and in most cases reflects contributions to reproduction and/or survival of a species).

SECONDARY DIMENSIONS

Resilience

From areas where the habitat structures or species are highly sensitive, easily perturbed, and slow to recover to areas where the habitat structures or species are robust, resistant to perturbation, or readily return to the pre-perturbation state.

Naturalness

From areas which are pristine and characterized by native species to areas which are highly perturbed by anthropogenic activities and/or with high abundances of introduced or cultured species.

Areas ranking 'high' on even one of the primary dimensions for a single species or habitat feature were considered Ecologically and Biologically Significant.

ANALYSIS

The justification for identifying an area as Ecologically and Biologically Significant is stronger when an area is listed as 'high' on several dimensions.

Assigned EBSA site scores derived from the evaluation matrix were based on an assigned value of 1 point for each 'high' functional, structural or biodiversity feature related to a primary dimension and ¼ point for each 'moderate' functional, structural or biodiversity feature of the same. Dimensions classified as 'low' were not included in the final matrix and did not receive any value towards individual site scores. In addition, no scores were given for any of the secondary dimensions since these are to be considered as modifiers in the process of determining priority status for areas that rank similarly on the primary dimensions.

Based on the above scoring regime, EBSAs identified for the PBGB LOMA were listed in order from highest to lowest total score.

Since not all information was based on quantitative data or existing maps (e.g. some marine mammals, some fish, some benthic invertebrates, seabirds and habitat) some inferences had to be made, and EBSAs were mapped (Fig. 1) based on best fit of overlapping distribution, biogeography, and bathymetry.

RESULTS AND DISCUSSION

Based on the available information and in accordance with the criteria for the Identification of EBSAs (DFO 2004), 11 EBSAs were identified and evaluated for the PBGB LOMA, including (in order of significance):

1. The Southeast Shoal and Tail of the Banks
2. Placentia Bay Extension
3. The Southwest Shelf Edge and Slope
4. St. Pierre Bank
5. Laurentian Channel and Slope
6. Smith Sound
7. Eastern Avalon
8. Lilly Canyon-Carson Canyon
9. Northeast Shelf and Slope
10. Burgeo Bank
11. Virgin Rocks

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Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
1. Southeast Shoal and Tail of the Banks (25.5 points) Area east of 51°W and south of 45°N, extending to the edge of Grand Bank	**High- Spawning/Breeding-** The Southeast Shoal is the only known offshore spawning site for Capelin (Fuller and Myers 2004; F. Mowbray pers. comm.). **High- Nursery/Rearing-** The Southeast shoal is the single nursery area of the entire stock of Yellowtail flounder (Walsh et al. 2001). **High- Oceanographic processes-** The Southeast Shoal has the warmest bottom water temperatures on the Grand Banks (Fuller and Myers 2004). **High- Oceanographic processes-** A well-defined gyre exists on the Southeast Shoal **High- Structural Habitat-** The Southeast Shoal is unique in that it is the only shallow sandy offshore shoal in the LOMA (Fuller and Myers 2004). **High- Biodiversity-** The Southeast Shoal was	**High- Spawning/Breeding-** Capelin and northern sand lance aggregate on the Southeast Shoal to spawn (Fuller and Myers 2004; F. Mowbray pers. comm.). **High- Spawning/Breeding-** The shoal is a spawning area for several groundfish species (American Plaice, Yellowtail Flounder, and Atlantic Cod) (Fuller and Myers 2004; Ollerhead et al. 2004). **High- Nursery/Rearing-** The Southeast shoal is an important nursery area for Yellowtail flounder, 3NO Cod, and American plaice (Walsh et al. 2001). **High- Feeding; Biodiversity-** The presence of important forage species in the area draws large aggregations marine mammals (especially humpbacks and northern bottlenose) and seabirds. **High- Feeding-** The greatest concentration of Yellowtail flounder, the shallowest groundfish, is found on the Tail of the Banks, extending northwards	**High- Spawning/Breeding-** Offshore spawning capelin may be a genetically separate population and therefore the Southeast Shoal could be considered an exclusive spawning area and vital to the fitness of the population (F. Mowbray pers. comm.) **High- Feeding-** Important seasonal foraging area for cetaceans (especially humpbacks) and seabirds **High- Biodiversity-** The Tail of the Banks is important to the survival of the Striped wolffish since it is listed by COSEWIC as being of "special concern" (ie…*"particularly sensitive to human activities or natural events…")* **Moderate- Biodiversity-** While the Southeast Shoal is not important to the survival of a greater proportion of the total species in the area, it is important to the survival and reproduction of several "degraded" species. The area is also important to supporting and maintaining the diversity of the benthos	**Moderate-** As a shallow shoal, the sandy bottom habitat that dominates the area is subject to regular physical disturbance by wave action from storms. So, the habitat itself is naturally dynamic and less sensitive to disturbance. However, the ecosystem and many of its components have been severely altered by fishing, which has altered community and ecosystem structure. For example, haddock and Atlantic cod were once abundant in this area but both species have been severely depleted by fishing and therefore are not fulfilling the same role in the ecosystem as they did in the past.	**Moderate to Low-** While regular physical disturbance from storms of the sandy bottom habitat is common in this area, the hydraulic dredging that that takes place on the shoal likely disturbs sediment to a greater depth and with a different impact than any natural disturbance. Many of the resources themselves have been depleted, with significantly lower-than-natural populations of Atlantic cod, American plaice and capelin, for example.

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
	the last part of the Grand Banks to be deglaciated. As a result, relict populations of blue mussel, wedge clam and capelin associated with beach habitats from the last glacial advance remain in the area. The two bivalve species are typically found in inshore areas and capelin normally spawn on beaches so all of these populations are unique (Fuller and Myers 2004; F. Mowbray pers. comm.). **High- Biodiversity-** The Southeast Shoal contains the highest benthic biomass on the Grand Bank (Walsh et al. 2001)	over the Southeast Shoal and central Grand Bank (Kulka et al. 2003) **High- Oceanographic processes-** The Southeast Shoal is an area of high primary productivity. **High- Biodiversity-** The densest concentration of Striped wolffish (listed as 'special concern' by COSEWIC) occurs on the Tail of the Banks **Moderate- Feeding-** Although American Plaice is distributed across all of the Grand Banks, an area of highest density is returning to the Tail of the Banks since the mid 1990's (Kulka et al. 2003)	found there.	Thus, given the disturbed state of the ecosystem, it is highly probable that ecosystem and community resilience in the Southeast Shoal area has been diminished, leaving it sensitive to further disturbance.	
2. Placentia Bay Extension (24.25 points) Area including all of Placentia Bay and across the mouth of the bay from Point Crewe on the Burin Peninsula to Point Lance on the Avalon Peninsula out to the 50 m isobath.	**High- Oceanographic processes-** Counter-clockwise gyre; offshoot of Labrador current enters east and exits west. **High- Oceanographic processes-** Localized upwelling at headlands where currents meet (Burin Peninsula	**High- Nursing/Rearing-** High concentrations of ichthyoplankton (Cod, cunner, plaice, capelin and others) occur in Placentia Bay. **High- Oceanographic processes-** High primary and secondary production occurs in the bay and at headlands.	**High- Spawning-** The largest spawning stock of Atlantic cod in NW Atlantic occurs in Placentia Bay. **High- Nursing/Rearing-** Due to the characteristics of the area; it is important to the survival and dispersal of high concentrations of ichthyoplankton (Cod,	**High-** Important coastal spawning and nursing areas in Placentia Bay are highly sensitive to disturbance, as are important bird breeding areas along the coastline.	**Moderate-** High levels of commercial and industrial activity that has occurred in and around Placentia Bay over time has led to regions of contamination and disturbance.

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
	south and Cape St. Mary's). **High- Oceanographic processes-** Stable temperature and salinity compared to other embayments **High- Spawning-** The largest spawning stock of Atlantic cod in the NW Atlantic occurs in Placentia Bay **High- Biodiversity** The area around Placentia Bay and extension is an Important Bird Area as defined by its importance to and concentration of to many seabird species; Many ceteaceans and leatherback turtles aggregate in spring and summer; harbour seals and otters use the area year round. High pelagic and demersal diversity occurs in Placentia Bay. The area also supports a high biomass of birds and terrestrial mammals typical of river and estuarine habitats	**High- Spawning-** The largest spawning stock of Atlantic cod in the NW Atlantic occurs in Placentia Bay. **High- Nesting; Feeding; Refugia-** Important Bird Area- (nesting, feeding, and overwintering) (e.g. atlantic puffin, black-legged kittiwake, black guillmot, common murre, greater black backed gull, greater shearwater, northern fulmar, northern gannet). **High – Feeding** Many cetaceans and leatherback turtles aggregate and feed from spring to fall; harbour seals, otters, and some cetaceans feed in the area year round **High - Reproduction** A historic harbour seal haulout and pupping site occurs at and around Pt. May **High – Migration** Historic summer aggregation area for migratory marine mammals; possible migratory path for leatherbacks	cunner, plaice, capelin and others) that occur in Placentia Bay. **High- Nesting; Feeding; Refugia-** Important Bird Area- (nesting, feeding, and overwintering) (e.g. atlantic puffin, black-legged kittiwake, black guillmot, common murre, greater black backed gull, greater shearwater, northern fulmar, northern gannet). **Moderate - Feeding; Migration** A potentially important feeding area for migrating leatherbacks; prey may be concentrated here **High- Nursing/Rearing** Important pupping area for harbour seals (3 key areas in Placentia Bay); Otters reproduce in the area; Females with young cetaceans inhabit the area during critical feeding periods. **High - Feeding** Important feeding area for marine mammals –		

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EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
			especially porpoises and humpback whales; prey are concentrated here		
3. Southwest Shelf Edge and Slope (20.25 points) Area from 55°W to 52°W, encompassing the shelf edge of Grand Bank to the 2000 m isobath	**High- Feeding-** The highest density of pelagic seabird feeding within the LOMA occurs along the Southwest Shelf (WWF 2006). **High- Feeding-** This area is host to the northernmost population of haddock in the Northwest Atlantic Ocean (WWF 2006). **High- Structural Habitat-** Cold-water coral species concentration is highest in this area (Edinger et al. 2007). **High- Biodiversity-** Cold-water coral species diversity is highest in this area (Edinger et al. 2007). **High- Biodiversity-** The greatest number of groundfish species on the banks occurs on the Southwest Slope (Kulka et al. 2003).	**High- Spawning/Breeding-** Haddock in the region spawn primarily along the edge of the Southwest slope in spring (Ollerhead et al. 2004) **High- Feeding-** The Southwest Shelf, with its high concentration of available prey, is an intense feeding area for a wide variety of seabird species **High- Feeding; Biodiversity-** Aggregation of many marine mammals and leatherback turtles - particularly in the summer **High- Feeding-** Haddock in the region are found primarily within the southern part of the Banks, with the highest concentrations along the Southwest slope (Kulka et al. 2003) **High- Feeding-** Atlantic Halibut in the region are found almost exclusively	**High- Spawning/Breeding-** The southwest slope of the Grand Bank is an important spawning area for redfish (Ollerhead et al. 2004). **High- Feeding-** Seabird feeding in the area occurs in a manner that is critical to fitness, productivity and population stability due to high energy requirements of obtaining food, reproduction, and nesting **High- Migration-** The Southwest Shelf and Slope constitutes a migration route for cod and therefore carries fitness consequences (WWF 2006). **High- Structural Habitat-** Structure-forming gorgonian corals are found in high concentrations in this area (Edinger et al. 2007). **High- Biodiversity-** The SW Slope is very important to the survival and reproduction of many species	**High to Moderate-** Hard substrates are found in the Southwest Slope area; along with sessile, brittle, slow-growing corals that are highly sensitive to disturbance. The bottom habitat in the Southwest Shelf area is less sensitive to disturbance but traditionally dominant species, such as haddock, have been depleted so the community and ecosystem is less resilient (WWF 2006). Off the bottom, the area is a naturally dynamic environment, with open access to	**Moderate to Low-** A high rate of coral bycatch and high fishing effort in this area indicates that the ecosystem and habitats have already been heavily impacted.

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
	High- Biodiversity- The highest density of pelagic seabirds within the LOMA is found here (WWF 2006). **Moderate- Oceanographic Processes-** Waters along the edge of an offshore bank are highly productive due to upwelling, which brings nutrient-rich deep water to the surface through a combination of factors including bottom topography, wind and currents—similar features are found at the edges of other banks in the region.	along the Southwest slope during spring (Kulka et al. 2003) **High- Structural Habitat-** Cold-water corals –are found in high concentrations in this area (Edinger et al. 2007). **High- Biodiversity-** A greater proportion of the biomass of most of the groundfish species present occurs along the Southwest Slope (Kulka et al. 2003). **Moderate- Feeding-** Monkfish, Pollock, and White Hake in the region occur exclusively along the Southwest Slope and within the Laurentian Channel, with higher concentrations in spring (Kulka et al. 2003). **Moderate- Feeding-** Although the species is broadly distributed, a proportion of the remnant high density of Atlantic Cod occurs along the Southwest edge and slope of the Grand Banks (Kulka et al. 2003).	as a cumulative result of structural and oceanographic features and ecological functions in the area supporting a high diversity of species in a relatively defined (and often relatively exclusive) area.	larger oceanic areas	

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
4. St. Pierre Bank (10 points) Northwest St. Pierre Bank, south and west of the Canada-France International Boundary, to the 200 m isobath	**High- Feeding; Biodiversity-** Highest and only concentration Sea scallops on the Grand Banks—no alternate area is being used by this species in the region (F. Cahill, DFO, pers. comm.).	**High- Spawning/Breeding-** Highest proportion of Sea scallops spawning on St. Pierre bank in spring (F. Cahill, DFO, pers. comm.). **High- Feeding; Biodiversity-** Highest and only concentration Sea scallops on the Grand Banks (F. Cahill, DFO, pers. comm.). **High- Feeding-** At their northernmost extent in the Northwest Atlantic, the highest concentration of Spiny dogfish occurs at the western portion of St. Pierre Bank (Kulka 2006). **High- Feeding** Several species of cetaceans are known to feed in the area	**High- Feeding; Biodiversity-** St. Pierre Banks contains the highest and only concentration Sea scallops on the Grand Banks, therefore the area's contribution to annual growth and condition is great (F. Cahill, DFO, pers. comm.). **High- Feeding; Migration-** A potentially important spring feeding area for overwintering and migrating whales	**Low-** While the area of St. Pierre Bank has been heavily dragged for scallops, the benthic community structure in the area appears to recover successfully due to its very sandy bottom habitat.	**Moderate-** While St. Pierre Bank is not without disturbance, community structure over the long-term appears to be stable.
5. Laurentian Channel and Slope (9.5 points) Area from 45°N to 47.5°N, from the slopes of the banks into the Laurentian Channel to the western boundary of the LOMA.	**High – Structural Habitat** Interface of sea ice and open ocean in the late winter and early spring; occasional openings to St. George's Bay can lead to ice entrapments **High- Nursery/Rearing-** This is the sole pupping grounds for black dogfish off Canada (Kulka 2006).	**High- Nursery/Rearing-** The Laurentian Channel is an important juvenile/nursery area for Smooth skate (< 30cm) (Kulka et al 2007). **High- Migration-** While the Laurentian Channel is not identified as being used for migration by most of the individuals of any single population, a	**High- Nursery/Rearing-** As the sole pupping grounds off Canada for black dogfish, the area supports increased survivorship/ fitness of juveniles compared to other areas. **High- Migration-** The Laurentian Channel as a migration route favors population fitness of many	**Low-** While the area along the slope of the Laurentian Channel contains some corals and may be sensitive to the effects of bottom disturbance, the area as a whole is less sensitive.	**High-** While the area has been heavily fished and, the habitat is probably relatively intact compared to other areas in the LOMA.

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
	High- Feeding- This area (the Laurentian Channel in the proximity of St. Pierre Bank) contains the highest concentration of black dogfish in waters of Canada (Kulka 2006). High- Migration; Biodiversity- Cabot Strait is an important migratory corridor for marine mammals moving in and out of the Gulf of St. Lawrence; no alternate route exists. Moderate- Oceanographic processes- Although not unique to the LOMA as a whole, upwelling along offshore slopes and channels leads to enhanced productivity year-round.	noteworthy percentage of several species are known to use the area on a regular basis (e.g. for movement to and from the Gulf of St. Lawrence seasonally). High- Oceanographic processes- Enhanced primary and secondary production in the area leads to aggregation of prey and consumers. Moderate- Feeding- Monkfish, Pollock, and White Hake in the region occur exclusively along the Southwest Slope and the region of the Laurentian Channel, with higher concentrations in spring (Kulka et al. 2003).	marine species through either the route itself or its endpoints; e.g. marine mammals migrating to feeding/breeding grounds seasonally and finfish to overwintering/spawning grounds. High- Oceanographic processes- Enhanced primary and secondary production has both direct and indirect impacts on local ecosystem function.		
6. Smith Sound (8 points) Coastal area located in Trinity Bay (near 48.25°N; 53.5°W) on the east coast of Newfoundland	High- Spawning/Breeding- Smith Sound is the largest remaining known spawning area for northern cod (FRCC 2000). High- Seasonal Refugia- Smith Sound is an important overwintering	High- Spawning/Breeding- Smith Sound is the largest remaining known spawning area for northern cod (FRCC 2000). High- Nursery/Rearing- Northern cod egg/larval densities are highest in the vicinity of Smith Sound.	High- Spawning/Breeding- The FRCC (2000) found that the Smith Sound aggregation of northern cod is unique and may be critical to recovery of the population. High- Seasonal Refugia- Much of the currently known spawning that occurs along	Moderate- The Smith Sound habitat is not particularly sensitive relative to other areas along the coast. However, the ecosystem	High- Although heavily fished in the past, the Smith Sound area habitat is mainly undisturbed.

Table 1. Cont'd.

EBSA Site (Name/Description)	**Uniqueness** (Rarity)	**Aggregation** (Density/Concentration)	**Fitness Consequences** (Importance to Reproduction/Survival)	**Sensitivity** (Resilience to Disturbance)	**Naturalness** (Undisturbed State of Habitat)
	area for the severely depleted population of Northern Cod (FRCC 2000). Much of the currently known spawning that occurs along the northeast Newfoundland coast appears to originate from migrating subgroups of cod which have overwintered in Smith Sound (R. Gregory, DFO, pers. comm.).	decreasing with distance from the mouth of Smith Sound, presumably due to the spawning activity known to occur in the Sound itself (R. Gregory, DFO, pers. comm.). We also know that there is good nursery habitat in the sound. Currently, we have little knowledge as to the extent this habitat is used as a juvenilke nursey (subject of an ongoing DFO investigation) **High- Migration-** At the present time, Smith Sound appears to be a staging area for migration as tagging work by John Brattey, suggest that fish leave Smith Sound in spring and move north. Many fish also move into or return to Smith Sound in fall (C. Morris, DFO, pers. comm.). **High- Seasonal Refugia-** The very dense aggregation of fish, in the relatively small geographical space of Smith Sound during the winter months, not only represents the largest group in terms of numbers of fish, but they are also very large in size.	the northeast Newfoundland coast appears to originate from migrating subgroups of cod which have overwintered in Smith Sound. In addition, many of the cod that overwinter in Smith Sound are large fish which can potentially contribute large numbers of eggs to the smith sound ecosystem and beyond smith sound (R. Gregory, DFO, pers. comm.).	structure within the area may be more sensitive since cod appear to concentrate, for some reason, in a relatively small area of habitat in Smith Sound, where the effect of any disturbance could have dramatic effects. For example the large fish kill that occurred several years ago in Smith Sound is thought to be due to low water temperatures.	

Table 1. Cont'd.

EBSA Site (Name/Description)	Uniqueness (Rarity)	Aggregation (Density/Concentration)	Fitness Consequences (Importance to Reproduction/Survival)	Sensitivity (Resilience to Disturbance)	Naturalness (Undisturbed State of Habitat)
7. Eastern Avalon Coast (5.0 points) Area from Blackhead to Cappahayden out to the 100m	**High – Biodiversity** Cetaceans, leatherback turtles, seals, and seabirds aggregate to feed in the spring to fall	**High- Feeding** Historic aggregation of many marine mammals - particularly in the summer	**High- Feeding** This area provides a potentially important feeding area for marine mammals – especially humpback whales; prey are concentrated here	**Low-** A naturally dynamic environment, with open access to larger oceanic areas	**High-** An area of low development to date; shipping traffic and fisheries could cause local disturbance
8. Lilly Canyon-Carson Canyon (4.0 points) Area from 44.8°N to 45.6°N along the 200 m isobath of the southeast slope of Grand Bank	**Low-** Although important to the feeding and productivity of Iceland Scallops, the species occurs elsewhere and the canyons themselves are not unique in that various other canyons occur throughout the Grand Banks.	**High- Feeding-** High proportion of Iceland scallops occur in Lilly and Carson Canyons (F. Cahill, DFO, pers. comm.; Ollerhead et al. 2004). **High- Feeding; Seasonal refuge-** Year round aggregation of marine mammals for feeding and overwintering	**High– Feeding-** High productivity (quick growth and high yields) for Iceland scallops occurs in the Lilly and Carson Canyons (F. Cahill, DFO, pers. comm.).	**Moderate-** While the shallower parts of the canyons have been heavily fished in the past, the area remains productive due to physical and biological oceanographic processes occurring there.	**High-** While the area of the Lilly Canyon-Carson has been heavily fished in the past, the area remains highly productive, and the deeper parts of the canyons are relatively undisturbed.
9. Northeast Shelf and Slope (3.5 points) Area on northeastern Grand Bank, starting at the Nose of the Bank, from 48°W to 50°W, and from the edge of the shelf to the 1000 m isobath	**Low-** While the area may be deemed significant based on function to some species, it has no apparent uniqueness otherwise.	**High- Feeding-** Greatest proportion Spotted Wolffish (listed as "threatened" under COSEWIC) are aggregated here in spring (Kulka et al. 2003). **Moderate– Feeding-** Although broadly distributed along shelf edges, the highest concentration of Greenland Halibut is aggregated here in spring (Kulka et al. 2003).	**High- Feeding-** Due to the "threatened" status of the Spotted Wolffish and the proportion of the population occupying the area, the northeastern edge of the Grand Banks is important to the species' short and long-term sustainability. **Moderate- Feeding** Potentially important feeding area for marine mammals	**Low-** The area of the northeast shelf and slope is not particularly sensitive compared to other slope areas occurring in the region.	**Moderate -**

Table 1. Cont'd.

EBSA Site (Name/Description)	**Uniqueness** (Rarity)	**Aggregation** (Density/Concentration)	**Fitness Consequences** (Importance to Reproduction/Survival)	**Sensitivity** (Resilience to Disturbance)	**Naturalness** (Undisturbed State of Habitat)
		High- Feeding Aggregation of marine mammals – particularly harp seals (Sackville Spur west), hooded seals (Sackville Spur east) and pilot whales.			
10. Burgeo Bank (3.25 points) Burgeo Bank, the area following the 200 m isobath, south of 47.5˚N	**High- Biodiversity-** The 3Pn4RS and 3PS Cod stocks mix in this area during spring (WWF pers. comm.).	**High- Spawning –** Cod aggregate in this area to spawn, with a peak in March and April (Ollerhead et al. 2004). **High- Seasonal Refugia-** Burgeo Bank is an important overwintering and mixing area for 3Ps cod (WWF pers comm.).	**Moderate- Spawning** Although they are known to spawn in other areas, Burgeo Bank is an important spawning area for cod.	**Moderate-** The Burgeo Bank habitat is probably relatively resilient but the remaining cod population and ecosystem as a whole is sensitive to disturbance because it has been altered by fishing.	**Moderate-** The habitat is probably relatively intact but the ecosystem has been altered by fishing but not to the extent of other areas (e.g., southern Grand Bank).
11. Virgin Rocks (2.5 points) In the area from 46-46.8˚N and from 50-51˚W	**High- Physical Features-** This area is unique from a geological perspective, as these large nearly exposed rocks found near the middle of the bank constitute a one of a kind geological feature/ habitat in the LOMA.	**High- Feeding-** Seabirds are known to congregate in the vicinity of the rocks, as are their prey species, capelin. **Moderate- Spawning/Breeding** Groundfish – including Atlantic cod, American plaice and yellowtail flounder – aggregate in this general area to spawn; but also spawn over a disjunct range (Ollerhead et al. 2004).	**Moderate- Spawning/Breeding-** Although they are known to spawn elsewhere, the area surrounding the Virgin Rocks appears to be an important spawning area for several groundfish species – including Atlantic cod, American plaice and Yellowtail flounder (Ollerhead et al. 2004).	**Moderate-** The habitat surrounding the Virgin Rocks is less sensitive to disturbance but several of the traditionally abundant species in the area have been depleted so the community and ecosystem is less resilient.	**Moderate-** Natural disturbance is relatively high in this area so habitat is probably relatively intact. Intensive fishing has occurred in this area so the community and ecosystem has already been altered

Figure 1. Placentia Bay Grand Banks Large Ocean Management Area: Ecologically and Biologically Significant Areas.

1. The Southeast Shoal and Tail of the Banks
2. Placentia Bay Extension
3. The Southwest Shelf Edge and Slope
4. St. Pierre Bank
5. Laurentian Channel and Slope
6. Smith Sound
7. Eastern Avalon
8. Lilly Canyon-Carson Canyon
9. Northeast Shelf and Slope
10. Burgeo Bank
11. Virgin Rocks